Dan J. Wittliff

EDUCATION

Southern Methodist University - B.S. in Mechanical Engineering, 1972

University of Oklahoma - Master of Business Administration, 1975

PROFESSIONAL LICENSES

Licensed Professional Engineer in the State of Texas

Licensed Professional Engineer in the State of Tennessee

Licensed Professional Engineer in the State of South Carolina

MEMBERSHIPS

National Society of Professional Engineers (President 2012-2013 and Fellow)

National Engineers Week Foundation Board of Directors (Member 2013 – 2018, President 2017-2018)

Texas Society of Professional Engineers (President 2002-2003)

American Academy of Environmental Engineers (Diplomate, General; Member Board of Trustees, 2010-2015)

Solid Waste Association of North America (SWANA) and Texas Solid Waste Association of North America (TxSWANA)

CERTIFICATIONS

Radiation Safety Officer (1985 to present)

Registered Environmental Manager (1994-2003)

EXECUTIVE PROFILE

Dan Wittliff, P.E., DEE, F. NSPE serves as Managing Director of Environmental Services with GDS Associates, Inc. in Austin, Texas. In this role, he keeps complex and multi-media (e.g., air, water, wastewater, and solid waste) environmental projects on schedule and within budget. Mr. Wittliff maintains regular contact with the client, regulatory agencies, engineers, and contractors involved in a project. Because of his experience in government and industry, Mr. Wittliff is a skilled consensus builder who proactively engages the community on behalf of clients to address relevant issues early and economically.

Prior to joining GDS, Mr. Wittliff was Principal of Dan Wittliff Consulting, PLLC. This firm provided professional engineering services in environmental engineering, regulatory affairs, and energy systems. Prior to starting his own company, Mr. Wittliff served as Vice-President and Chief Operating Officer of HydroProcessing, LLC, the Austin-based technology company that has developed patented and proprietary technology for the conversion of municipal, agricultural, or industrial organic sludge into useful products or power.

From 1995 through 1999, Mr. Wittliff served as the first Chief Engineer for the Texas Natural Resource Conservation Commission (TNRCC, now TCEQ). Upon leaving TNRCC, he worked with Naismith Engineering, Inc. for two years providing consulting services to a wide array of industrial and municipal clients. Before service with TNRCC, Mr. Wittliff served in several supervisory positions with West Texas Utilities Company, Abilene, TX managing and monitoring power station performance to include issues related to air pollution, water treatment, industrial hygiene, and solid waste disposal. Mr. Wittliff is also a frequent speaker at engineering and trade association conferences and seminars and has published articles in industry journals. On behalf of his clients, he is an advocate for cutting edge technology to improve operation, compliance, and finances. He also serves on the Board of Advisors to the

Environmental and Civil Engineering Department of Southern Methodist University where he taught a graduate course in construction management. In May 2017, the SMU Board of Trustees approved Mr. Wittliff to serve on the Lyle School of Engineering Executive Board.

Wittliff retired in 2002 from the United State Air Force Reserve at the rank of colonel. His active duty career included a stint as the commander of communications organization on a mountaintop in Central Turkey. His military awards and distinctions include the Legion of Merit, Meritorious Service Medal with five oak leaf clusters, Outstanding Graduate of Air War College, and the Air Force Communications-Electronics Professionalism Award.

The National Society of Professional Engineers (NSPE) House of Delegates elected Dan Wittliff, P.E., Fellow NSPE, DEE as President in 2012–13. Wittliff also received the 2010 President's Award for his work in leading the Software Engineering Licensing Consortium, an effort to provide software engineers with a path forward to licensure. He became the first two-time recipient of the President's Award in 2016 for his work in forming and leading the NSPE Committee on Policy and Advocacy (COPA) to assume and streamline the work previously done by two long standing NSPE committees, LQPC and LGAC. In 2018, Wittliff received his third President's Award for his work as Chair of COPA.

Since joining NSPE in 1972, Mr. Wittliff has served in various leadership positions including president of the Abilene Chapter and the Texas Society of Professional Engineers where he was honored as Engineer of the Year in 1998 and Distinguished Engineer of the Texas Engineering Foundation in 2001. He was made a Fellow of NSPE in 2004. In July 2017, NSPE awarded Mr. Wittliff the NSPE Award, the society's highest honor, for his "outstanding contributions to the engineering profession, the public welfare, and humankind."

PROFESSIONAL EXPERIENCE

Facility Permitting, Design, and Construction

Mr. Wittliff works closely with regulators and owners to permit and build facilities that: (1) comply with the law, (2) make good engineering and economic sense, (3) come in on schedule and (4) maintain regulatory compliance. Listed below is a sample of the permitting and construction work that Mr. Wittliff accomplished.

- **Provided Testimony on Behalf of South Carolina Office of Regulatory Staff**. Beginning in 2017 and culminating with scheduled testimony in early 2019, Wittliff reviewed Duke Energy Progress's (DEP) and Duke Energy Carolinas' (DEC) plans to comply with EPA's Coal Combustion Residuals (CCR) Regulations and the North Carolina enacted Coal Ash Management Act (CAMA), and provided a high level technical assessment key questions regarding the prudency and potential negligence of DEP as well as the costs associated with the company's design, installation, and maintenance of CCR impoundments. Additionally, Wittliff was tasked with determining how much of the closure and remediation costs is attributable with CAMA compliance.
- **Provided Testimony on Behalf of North Carolina Attorney General.** In 2017 and 2018, Wittliff reviewed Duke Energy Progress's (DEP) and Duke Energy Carolinas' (DEC) plans to comply with EPA's Coal Combustion Residuals (CCR) Regulations and the North Carolina enacted Coal Ash Management Act (CAMA), and provided a high level technical assessment key questions regarding the prudency and potential negligence of DEP as well as the costs associated with the company's design, installation, and maintenance of CCR impoundments.
- **Review of Coal Ash Cost Recovery by DEP.** Earlier in 2016, Wittliff provided technical expertise to support coal ash cost negotiations with Duke on behalf of the North Carolina Eastern Municipal Power Agency and Fayetteville Public Works Commission, who are wholesale customers of DEP. More specifically, Wittliff reviewed Duke Energy Progress's (DEP) plans to comply with EPA's Coal Combustion Residuals (CCR) Regulations and the North Carolina enacted Coal Ash Management Act (CAMA), and provide a high level technical assessment key questions regarding the prudency and

potential negligence of DEP as well as the costs associated with the company's design, installation, and maintenance of CCR impoundments.

- **Environmental Compliance Procedures and Training for Larsen Farms.** Prepared compliance procedures for environmental air permits for 20 MW power generation facility in support of 60,000-acre farming operation in the Texas Panhandle. Conducted operator training in those same procedures and permit requirements.
- **Environmental Permitting for Larsen Farms Power Generation facility.** Prepared and obtained air construction and operations permits for 20 MW power generation facility in support of 60,000-acre farming operation in the Texas Panhandle. Also wrote Spill Prevention Control and Countermeasures (SPCC) Plan as well as compliance procedures.
- **Environmental Compliance Audit of Larsen Farms Power Facilities.** Reviewed air, water, storm water, waste water, emergency response, storage tanks, and solid waste compliance posture for 20 MW facility in the Texas Panhandle. Audit was conducted in accordance with the Texas ECA Program rules and the applicable rules and ordinances in effect.
- **Review of Environmental Issues Associated with Purchase of Cedar Bay Power Station.** On behalf of the Office of Public Counsel for the Florida Public Service Commission in Docket Number 150075-EI, reviewed documents regarding preexisting contamination at the brownfield site and Florida Power and Light's assessment of environmental risk. Testified orally before the Commission on salient issues that resulted in concessions from the Company to address.
- **Environmental Compliance Audit of Marshfield Utilities.** Reviewed air, water, storm water, waste water, emergency response, storage tanks, and solid waste compliance posture for 60 MW facility in Wisconsin. Audit was conducted in accordance with the State's ECA Program rules and the applicable rules and ordinances in effect.
- **Review of Environmental Issues Associated with Routing of 138 kV Transmission Line.** On behalf of the Hillwood Group, reviewed extensive documents associated with the routing of the Hicks-Elizabeth Creek CCN in North Texas. Submitted written testimony before the Texas Public Utilities Commission on SOAH Docket Number 473-14-2252 and PUC Docket Number 42087.
- **Multi-Media Permitting for 49 MW Biomass Energy Project.** Managed agency contacts, environmental permitting, and public outreach for 49 MW biomass energy project in East Texas. Scope included new source review permitting, acid rain permitting, Title V operating permits, wetlands review, cultural and historic review, storm water permitting and pollution prevention, and waste registration.
- **Assessment and Remediation of Lead Acid Battery Recycling Facility.** Oversaw and coordinated assessment, health effects, modeling, and environmental agency relations on $45 million acquisition and remediation of 50-year old lead smelter. Evaluated pollution control technology options and prepared cost effectiveness analysis of different remediation options based on projected end land use.
- **Greenhouse Gas (GHG) Compliance Reviews and Estimates.** Provided compliance reviews two large municipal solid waste landfills in Texas. Developed strategy and methodology for complying with USEPA regulations under 40 CFR 98, Subpart HH. Continued with GHG reporting to EPA in subsequent years.
- **Review of Renewable Fuels for Industrial and Power Generation Projects.** Reviewed and evaluated landfill gas and biomass as alternative, renewable fuels for 15 MW landfill gas power plant and a 36 MW to 140 MW mixed fuels electric power projects in Missouri, 50 MW biomass power plant in Texas, 25 MW to 30 MW refuse derived fuel and landfill gas power plant, and a secondary aluminum smelter in Texas.

- **Multi-Media Permitting for Two 150 MW Combustion Turbine Projects.** Managed agency contacts, environmental permitting, and public outreach for two East Texas sites each with two 75 MW combustion turbines. Scope included new source review permitting, acid rain permitting, Title V operating permits, wetlands review, cultural and historic review, storm water permitting and pollution prevention, and waste registration.
- **National Electric Reliability Council (NERC) Security Reviews.** Conducted physical and compliance reviews of six power stations with 27 generators capable of producing thousands of megawatts in electrical generation. Identified key security and reliability issues for resolution by owners and operators.
- **Multi-Media Permitting for 24 MW Hydroelectric Power Project.** Managed agency contacts, environmental permitting, and public outreach for hydroelectric project located on 83,000 acre reservoir in East Texas. Scope included wetlands review, 401 Certification, water rights, endangered and threatened species for power project and associated 138 kV transmission line.
- **New Source Review Permitting and Owner's Engineer for Organic Fertilizer Plant.** Wrote application for registration of innovative organic fertilizer plant under several permits by rule for air emissions. Negotiated with TCEQ on client's behalf the emissions limits and terms of the permit.
- **Air Quality Review for City of Frisco, Texas.** Conducted a detailed assessment of air quality in southeast Frisco, Texas that involved designing an air sampling protocol to detect and quantify short-term excursions (peaks) of 226 gas and particulate concentrations downwind of two concrete and one hot mix asphalt batch plants. Trained citizens to collect air samples. Oversaw the collection of samples. Prepared a thorough report on analysis of results and likely health effects. Coordinated with TCEQ officials on the findings of the effort. Assisted the City in drafting an air quality ordinance that was later adopted. Assisted the City in responding to the USEPA changes to the NAAQS for lead as well as non-attainment area designation. Worked directly with leaders of USEPA Region 6 and TCEQ.
- **New Source Review and Title V Operating Permits and Compliance for Nine Municipal Solid Waste (MSW) Facilities.** Provided essential support to permitting team and provided key testimony before state officials to secure a MSW permit for six landfills and three transfer stations. Wrote and secured from state regulators a standard air permits and permits by rule for these facilities. Modeled landfill gas emissions and developed a compliance timeline for relevant LFG control systems. Wrote application for a Title V Air Operating Permit for these facilities. Worked with client and legal team to resolve compliance and enforcement issues.
- **Dismantling of Boilers 1, 2, 3, and 4 at Rodemacher Power Station, Lafayette, Louisiana.** Assessed regulatory issues associated with removing lead paint, asbestos, and PCB from four boilers between 45 and 53 years old. Oversaw the abatement and demolition as Owner's Representative. Coordinated resolution of contract interpretations with owner, contractor(s), and engineering team.
- **Texas Emissions Reductions for Off-Road Diesel Engines.** Worked with TxSWANA legal team and Metroplex area members to craft a strategy for complying with an off-road diesel equipment ban while keeping area landfill operations open. Surveyed 47 DFW MSW facilities including: 17 landfills, 15 transfer stations, 6 composters, and 9 recyclers. Developed equipment counts and air emissions by facility type (345 Total): 228 at landfills, 32 at transfer stations, 57 at composters, and 28 at recyclers. Presented findings to Commissioner and senior staff at TNRCC.
- **Environmental Due Diligence Reviews of Four Power Stations.** Conducted compliance and regulatory reviews for air, water, solid waste, wastewater, and safety at solid fuel and gas-fired power stations in Texas, Nevada, Utah, Louisiana, and Mississippi. Interviewed environmental regulators in the respective states to get a candid assessment of the compliance posture of each plant. Developed a risk and cost assessment for compliance issues.

- **Payson Power Project, Payson, Utah.** Evaluated suitability of city WWTP effluent for use in cooling system of a 150 MW combined cycle plant. Worked with city and client engineers to determine availability and cost of surface and ground water for use in power plant. Worked with client's engineers and attorneys and represented client to the Utah regulators on a New Source Review Air Permit for the project.
- **Environmental Services, West Texas Utilities, Abilene, Texas.** Managed the efforts of a professional environmental staff and a million plus dollar budget used in securing permits, determining fees, reporting compliance, and maintaining awareness for company's nine power stations, eight service facilities, and 1,100 employees. Supervised staff engaged in:
  - Air emissions, water rights, wastewater discharge, solid waste, and storm water permits;
  - Industrial hygiene and radiation safety;
  - Pollution prevention and emergency response, and
  - Coordinating with state's health and environmental agencies.
- **Oklaunion Power Station, West Texas Utilities, Vernon, Texas.** Supervised plant engineering staff and oversaw the efficiency of systems and equipment at this 720 MW coal-fired plant. Conducted comprehensive acceptance and operations tests of steam generator, turbine-generator, cooling/heating apparatus, and other power plant equipment according to the national test codes. Developed management, performance testing, and operations procedures. Coordinated environmental compliance and radiation safety program. Participated in last two years of construction, initial unit start-up, and checkout.
- **Power Plant Engineering, West Texas Utilities, Abilene, Texas.** Prepared support information and testimony used in fuel filing and reconciliation. Reviewed/evaluated contractor proposal for remediation of environmental problems. Served on Central and South West project team on standardized performance test procedures and online performance monitoring. Managed the company's power station performance testing program for 18 units in 8 locations. Co-authored the WTU *Environmental Policy Manual* and *Water Treatment Manual*. Managed computer retrofit of fuels measuring and monitoring at two plants. Responsible for performance efficiency of two gas-fired electric power units with a combined capacity of 362 MW. Developed engineering training manuals and supervised overhaul work at WTU plants. Managed company cathodic protection program. Wrote the company's power plant *Performance Testing Guide*. Supervised Fort Phantom Power Station Operations.

PUBLICATIONS AND PRESENTATIONS

- Authored *Power Plant Performance Testing Guide*, West Texas Utilities, Abilene, Texas, 1983.
- Co-authored *Environmental Policy Manual* and *Water Treatment Manual*, West Texas Utilities, Abilene, Texas, 1984-1985.
- "Overhauling WTU's Largest Gas-Fired Power Plant," *The Electric Times*, West Texas Utilities Company, Spring 1984.
- *From The Corners of My Mind*, A Collection of Poems by Dan Wittliff, 1993.
- "Regulatory Advances in Texas," Workshop on Coal Combustion Products, American Coal Ash Association, Savannah, Georgia, April 1997.
- "TNRCC Programs and Their Effect on Bio-Commercialization," *Biotreatment News*, DEVO Enterprises, Inc., August 1997.
- "TSPE and the Texas Board: Partners in Mentoring", *Licensure Exchange*, National Council of Examiners for Engineering and Surveying, December 1998.
- "Professional engineer development program in Texas upgrades staff capabilities," *Environmental Communique of the States*, Council of State Governments, January/February 1999.

- "Multi-Media Permitting," Session Chair, Environmental Permitting Symposium, United States Environmental Protection Agency, Research Triangle Park, North Carolina, February 1999.
- "Engineering Ethics," Ethics Seminar, Dallas County Bar Association, Dallas, Texas, December 1999.
- "Effluent Trading: A Water Quality Control Strategy Whose Time Has Come," *The Texas Professional Engineer*, Texas Society of Professional Engineers, March/April 2001.
- "Organizing State Volunteers for Homeland Security," Several Occasions for Southwest and Central Regions of NSPE as well as 2002 and 2003 NSPE Annual Meetings.
- "Title V Air Operating Permit: The Saga Continues," Presentation to the Metroplex Chapter of TxSWANA on January 22, 2004.
- "Air Permitting for Landfills," Session Facilitator, Annual Meeting of TxSWANA on March 31, 2004.
- "Effects of Rule Changes on Air Permits for MSW Facilities in Texas," Annual Meeting of TxSWANA on June 6, 2006."Ambient Air Quality Potential Health Risk Assessment in Southeast Frisco, Texas," for the City of Frisco, Texas in January 2007.
- "Trends in Homeland Security and Applying Homeland Security to the Nation's Electrical System," Annual Meeting of Louisiana Engineering Society on January 23, 2008.
- "LFG to Energy Alternatives," Annual Meeting of TxSWANA on April 1, 2008.
- "Comments on Proposed Revisions to 30 TAC 285, On-Site Sewage Facilities (OSSF), Rule Project Number 2007-033-285-CE," for Texas Society of Professional Engineers on May 1, 2008.
- "Results of Findings Regarding Garden Ville Composting Facility, TCEQ Docket Number 2006-1739-MLM-E," for Texas Landfill Management on August 15, 2008.
- "Results of Findings Regarding the Potential Inclusion of San Jacinto County in the HGB Non-Attainment Area," for San Jacinto County Commissioners Court, East Texas Electric Cooperatives, and Sam Houston Electric Cooperative on September 4, 2008.
- "Results of Findings Regarding Proposed Inclusion of Williamson County with Travis County in Austin-Round Rock Non-Attainment Area, TCEQ Docket Number 2008-1615-MIS," for Williamson County Commissioners Court on March 10, 2009.
- "Expanded Opportunity for MSW as Renewable Energy," Annual Meeting of TxSWANA on March 31, 2009.
- "Renewable Energy Projects," Annual Dual-State Meeting of the Louisiana and Mississippi Society of Professional Engineers on June 30, 2009.
- "Do Electrical and Electronics Engineers Need to be Licensed?" Seminar for the SMU Lyle School of Engineering on September 27, 2011.
- "Welcome to Wal-Mart: The Role of the U.S. P.E. in a Global Technology Market," Annual Meeting of Kansas Society of Professional Engineers June 2011 and Annual Meeting of National Association of Building Inspection Engineers February 2012.
- "Change and NSPE," *The Nebraska Engineer*, October 2012.
- "What Kind of Teacher are You?" *NSPE Professional Engineer* on October 2012.
- "Celebrating Our Public Servants," *NSPE Professional Engineer* on January 2013.
- "Creation of the Software Engineering Exam," Meeting of the Japan Society of Professional Engineers, Tokyo, Japan on June 14, 2013.
- "Partnering for the Future of America," NSPE Professional Engineer on April 2013.
- "National Science and Technology Policy," NSPE Professional Engineer on May 2013.

- "P.E.'s and Public Policy," *NSPE Professional Engineer* on June 2013.
- "Status NSPE Race for Relevance Implementation," Professional Engineers of North Carolina, Hot Springs, Virginia on June 27, 2013.
- "On the Path to Remaking NSPE," NSPE Professional Engineer on July 2013.
- "Ethics and the Professional Engineer," Two-Hour Seminars for the Senior Electrical Engineering Design Class at the University of Texas, Austin, Texas in 2014, 2015, 2016, and 2017. Also presented to the Wisconsin Society of Professional Engineers in 2013, Indiana Society of Professional Engineers in 2014, and GDS Associates Headquarters in 2015.
- "Tried in Public: Tips for Engineers in Public Meetings and Hearings," Two-hour seminar for the Annual Meeting of the Texas Society of Professional Engineers in June 2017 in Austin, Texas.

EXPERT TESTIMONY

- Expert Witness Testimony in the "Matter of Application of Duke Energy Carolinas, LLC For Adjustment of Rates and Charges Applicable to Electric Service in North Carolina North Carolina Utilities Commission in Docket No. E-7 Sub 1146 on January 19, 2018.
- Expert Witness Testimony in the "Matter of Application of Duke Energy Progress, LLC For Adjustment of Rates and Charges Applicable to Electric Service in North Carolina North Carolina Utilities Commission in Docket No. E-2 Sub 1142 on December 4, 2017.
- Expert Witness Testimony in the "Matter of Hicks-Elizabeth CCN Application (Texas SOAH Docket No. 473-14-2252", PUC Docket No. 42087) on June 17, 2014.
- Expert Witness Testimony in the Matter of "Petition for Approval of Arrangement to Mitigate Impact of Unfavorable Cedar Bay Power Purchase Obligation, by Florida Power & Light Company," Before the Florida Public Service Commission (PSC) Docket NO. 150075-EI on April 21, 2015.

NOTES ON DEC PLANT VISITS – Allen
JANUARY 8-10, 2018

Allen – On the morning of January 10, 2018, received safety briefing and overview briefing on development of the five-unit (1,140 MW) coal-fired power plant since 1957 and the associated ash basins and landfills. The five Allen units are now being used in peaking service which has decreased the consumption of coal and generation of ash. The plant and its impoundments back up to Lake Wylie. In 2009, the plant transitioned to dry fly ash disposal on site.

a. Coal Pile – Because of the change to peaking operations, the active coal pile is smaller than it was before the change. The unused portion of the coal pile footprint was cleared and the coal and soil was excavated to make room for a holding basin which is currently under construction and will be lined with a synthetic liner overlaid with a concrete working surface.

b. Landfills – Immediately south of the coal yard is the Retired Ash Basin and Active Landfill. All of the fly ash is landfilled because its high loss on ignition (carbon content) makes it unsuitable for resale. All of the FGD gypsum except for out of spec waste cake is sold for use in wall board manufacturing. The out of spec gypsum is disposed of in the landfill. The Active Landfill has a leachate collection system, liner, and leak detection. Cells 1 and 2A of the Active Landfill are currently covered with intermediate cover. There are no plans to expand the Active Landfill now that the units are not base loaded.

c. Ash Basins – The plant has a Retired Ash Basin and an Active Ash Basin. The Active Ash Basin has Cells 1 through 3 plus a Polishing Pond. Until the units convert to a dry bottom ash handling, the bottom ash is slurried to either Cell 2 or 3. In addition, yard drains and landfill leachate go into Cell 3 of the Active Ash Basin. Cell 1 is currently not in use.

d. Process Changes – As mentioned above, the plant is transitioning to the wet to dry bottom ash operations. As part of that transition, other waste streams will be rerouted away from the Ash Basin and to a new wastewater treatment facility that is under construction at the site. One feature of the FGD wastewater treatment system is a bioreactor to remove selenium

e. Drinking Water Issues – There are homes to the immediate west of the Active Ash Basin and these homes are subject to the drinking water supply requirements of HB 630. The details of these arrangements are being worked out. All of this even though the groundwater gradient runs away from these homes and to the east.

f. Seeps – There are 10 identified seeps or areas of wetness (AOW) at Allen. S-3, S-4. S-8, and S-8B are flowing. Engineered seeps will be permitted thought the NPDES permit while non-engineered seeps will be dealt with through a Special Order of Consent (SOC), both are equally binding. The original NPDES application was submitted in 2014, has undergone five revisions, and is expected to be issued final in the summer of 2018. Observed small flows coming from seeps XXXXXXXXXXX.

g. Remediation and Closure – The plan is to close the ash basins and dewater them. Once the material is dry and stable enough to work with heavy equipment, that equipment will shape the mass into a “domed” structure shedding water away from the mass. This material will be covered by a 40 mil FML liner and covered with 24 inches of soil, the top 6 inches of which must be able to support grass. The company is considering lower the Active Ash Basin dams. Thirty years of post-closure care for the impoundments is also required. The project team is on track to meet all CCR and CAMA deadlines.

h. Dan Stability and Factor of Safety – According to CCP engineers, some areas of the dam around the Active Ash Basin were slightly below the 1.5 safety factor. The company added additional rip-rap where needed to meet the required factor of safety.

Dan Wittliff
Exhibit 2.1.2 – December 2018 Site Visit - Allen

Tuesday 12/4

Allen

Duke staff: Tim Hill, Elizabeth Glenn (permitting), Steve Pulley (engineer), Scott Harris (system owner)

1. How many and how big are the units are on the site, when were they commissioned, and when did they or will they cease operations? **Unit 1 and 2 built in 1957, Unit 3 built in 1959, Unit 4 built in 1960, Unit 5 built in 1961. All are in operation, being run as peakers.**
2. How many CCR impoundments and landfills are on site, when were they built, and when were they decommissioned or closed? What is their capacity and how much is currently in place? **Active Basin, in operation from 1973 to present, Retired Basin, in operation from 1957-1973. Landfill built in 2009. Basins unlined, Landfill is double-lined according to Subtitle D. Ash stackout area is now used as a laydown area (temporary cover).**
3. Please describe how ash and sludge are conveyed to the impoundments or landfills. **Dry fly ash goes to landfill (since 2009). Wet bottom ash is sluiced to Active Ash Basin (currently in temporary sluice lines rerouted due to onsite work). Working on dry bottom ash conversion. Scrubber sludge filter cake is trucked to landfill.**
4. Were landfills lined with a Subtitle D compliant liner when they were built? Please describe the liners currently in place on plant landfills where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **The landfill is double-lined per Subtitle D.**
5. Were CCR surface impoundments (ponds) lined when they were built? Have they been lined since? Please describe the liners currently in place on plant surface impoundments where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **The basins are unlined.**
6. Please describe any issues that have occurred with seeps, leaks, or slope erosion on surface impoundments. What has been done to control, eliminate, or otherwise mitigate these issues? Were these seeps or leaks permitted under the NPDES program administered by the state? When were these permits issued? Are there any issues with discharge parameters that need treatment such as pH control? Please describe. **Permit renewal application went to the state in 2015, approved in 2018. Refined options analysis in November 2018. Spillway flow is checked weekly. AOW S3 is under the wastewater permit. AOW S4 is near new monitoring wells. New Ultra Filtration at water treatment facility (RO) for FGD wastewater.**
7. Please describe the closure plan and its associated schedule that have been submitted to the state environmental agency for each landfill or impoundment. What factors drove the choice of closure plan options? Please describe the costs associated with the closure plan for the closure action chosen and any other alternative closure options that were considered. **Nothing has been submitted to the state yet, expected Q3-Q4 2019. Options range from cap-in-place to hauling to an offsite landfill (prefer cap in place). Capping would involve 300 acres. Hybrid capping would involve reducing the footprint of the basin first before capping. Options are still under consideration.**

Dan Wittliff
Exhibit 2.1.2 – December 2018 Site Visit - Allen

8. What issues to ground water drinking supplies have been caused by the seeps and leaks from the surface impoundments or landfills? What has been to address these issues? **No pH controls in place. NPDES engineered seeps, and SOC non-engineered seeps (effective July 2018). Monthly monitoring has shown no SOC or NPDES exceedances. Neighbors to plant in ½ mile radius were offered water alternatives by Duke (100-200 homes).**
9. Please describe the process where CCR is generated, conveyed, stored/disposed, or reused? Include the fraction of the CCR that is bottom ash, fly ash, economizer ash, and scrubber sludge and how much of each is stored/disposed or sold or beneficially reused. Where beneficiation exists or is contemplated for a site, please describe the following: (a) the process itself, (b) the rationale for choosing this technology, (c) the rationale for choosing this site, (d) the schedule of completing this project, and (e) the costs/performance associated with project. **15-20% of the ash is bottom ash. Goes to the pond. Will eventually go to the landfill. Scrubber sludge is ~2% of the content.**

Dan Wittliff
Exhibit 2.2.1 – January 2018 Site Visit – Belews Creek

NOTES ON DEC PLANT VISITS – Belews Creek
JANUARY 8-10, 2018

Belews Creek – On the morning of January 8, 2018, received safety briefing and participated in overview discussion of issues on Ash Basin and Four Landfills (Pine Hall, Structural Fill, Craig, and FGD), ground water monitoring, city water supplies, NPDES permitting issues, and closure plan.

a. Site Walk Down – Together with System Owner (plus two environmental, one engineer, and attorney), walked the Ash Basin dams, toe and abutment drain flows and measurement. Saw flow measurement weirs for measuring flow in Flume 1 (0.15 feet and 5 gpm) and Flume 2 (0.35 feet and 179 gpm) engineered and not seeps. Saw new discharge structure for Ash Basin and the new pipeline for converting to a dry bottom ash process and lined water retention pond.

b. Closure Plans – Closure plan has not been submitted because DEC is waiting on DEQ to approve a "low priority" rating once (1) the ground water dinking supply issues are complete (Eden in 2017 and Madison's in 2016 TMH issues were done by upgrading the water treatment plants) and (2) complete the dam safety assessments required by CCR. DEC plans to cap in place the Ash Basin after dewatering the Ash Basin (bulk or free water followed by interstitial water), shaping the ash into well-drained feature, and covering the pile with a CCR compliant synthetic liner capable of $\leq 10^{-5}$ cm/sec. While this is a minimum requirement, the liner proposed by DEC will likely achieve performance closer to 2 feet of compacted clay (~10^{-7} cm/sec).

c. Inspection Schedule – Plant systems owner conducts weekly dam safety inspections using new and complete company checklist. In addition, the plant's impoundment is inspected annually by company engineers and every five years by outside, independent consultant.

d. Landfills – Regarding the four on-site landfills, the Structural Fill Landfill was closed in 2009 and the Pine Hall Road Landfill (unlined) was closed in 2008 while the FGD landfill (lined or unlined??) and the Craig Road Landfill (lined with leachate collection) continue in operation.

e. Disposition of CCR – According to plant personnel, about one-fourth of the dry fly ash produced at the site is disposed of in the Craig Road Landfill while the rest is sold or used beneficially. 95 percent of the scrubber sludge is sold for reuse. DEC contracted with Charrah and Ash Ventures to manage CCR.

Dan Wittliff
Exhibit 2.2.2 – December 2018 Site Visit – Belews Creek

Thursday 12/6

Belews Creek

Duke staff: Issa Zarzar, Jeff Gateley, Chris Hallman, Henry Taylor, Glen Harris, Reggie Anderson, Brenda Johnson
GDS staff: Dan Wittliff, Megan Morello
SC ORS staff: none

1. How many and how big are the units are on the site, when were they commissioned, and when did they or will they cease operations? **There are 2 coal units, built in early 1970s, Unit 1 COD 1974, Unit 2 COD 1975, 1170 MW each. No known upcoming retirement plans.**
2. How many CCR impoundments and landfills are on site, when were they built, and when were they decommissioned or closed? What is their capacity and how much is currently in place? **There is 1 ash basin, 2 closed landfills, a structural fill, and some beneficial reuse.**
3. Please describe how ash and sludge are conveyed to the impoundments or landfills. **Dry fly ash goes into silos, sold as Class F fly ash. Had ability to wet handle fly ash until recently when that ability was removed. Effluent water from wastewater treatment goes to the ash basin. Finishing conversion to dry bottom ash and fly ash. They have the ability to reclaim gypsum from the landfill to sell when the plant isn't producing/operating a lot. Gypsum is sold to wallboard company, or for farming if not to wallboard spec.**
4. Were landfills lined with a Subtitle D compliant liner when they were built? Please describe the liners currently in place on plant landfills where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **The Pine Hall Rd Landfill built in early/mid 1980s, operational until 2003. Craig Rd landfill built and operational in 2007/2008. Lined with geosynthetic membrane and leachate collection system. FGD Landfill was built alongside FGD system upgrade.**
5. Were CCR surface impoundments (ponds) lined when they were built? Have they been lined since? Please describe the liners currently in place on plant surface impoundments where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **The ash basin is unlined.**
6. Please describe any issues that have occurred with seeps, leaks, or slope erosion on surface impoundments. What has been done to control, eliminate, or otherwise mitigate these issues? Were these seeps or leaks permitted under the NPDES program administered by the state? When were these permits issued? Are there any issues with discharge parameters that need treatment such as pH control? Please describe. **In 2015, added weighted filter overlay – captured horizontal drains and surface seeps. Dam safety inspections weekly for the ash basins. SOC was finalized in July 2018 – sampling for surface water parameters quarterly. NPDES permit expected late Q1 2019 (March-ish). No continuous TSS/pH monitoring. The water storage tank has 17' left of vertical capacity.**
7. Please describe the closure plan and its associated schedule that have been submitted to the state environmental agency for each landfill or impoundment. What factors drove the choice of closure plan options? Please describe the costs associated with the closure plan for the closure

action chosen and any other alternative closure options that were considered. **Ash basin will be hybrid closure. About 60% of the basin's footprint has very little ash. They will push it into a smaller pile before capping to save money on cap material. Regular cap in place was the leading contender as of 2016 plans, but there were downstream impacts. The railroad and highway would be affected. Onsite landfills were considered. In spring 2018 they did borings and discovered the ash quantities were lower in many areas. They will build a detention pond to slow down water to road/railroad. Stop logs first to drain, then pumping to water treatment/discharge. Old drain went to lake, new one is "tributary 52" to Dan River. No final closure plan submitted yet. Craig Road landfill has not entered closure plan yet.**

8. What issues to ground water drinking supplies have been caused by the seeps and leaks from the surface impoundments or landfills? What has been to address these issues? **Not aware of any groundwater drinking water issues – but follow up with groundwater team. It was regulated that neighbors in a ½ mile radius were put on city water or given a new treatment system.**

9. Please describe the process where CCR is generated, conveyed, stored/disposed, or reused? Include the fraction of the CCR that is bottom ash, fly ash, economizer ash, and scrubber sludge and how much of each is stored/disposed or sold or beneficially reused. Where beneficiation exists or is contemplated for a site, please describe the following: (a) the process itself, (b) the rationale for choosing this technology, (c) the rationale for choosing this site, (d) the schedule of completing this project, and (e) the costs/performance associated with project. **Dry fly ash goes into silos, sold as Class F fly ash. Had ability to wet handle fly ash until recently when that ability was removed. Effluent water from wastewater treatment goes to the ash basin. Finishing conversion to dry bottom ash and fly ash. They have the ability to reclaim gypsum from the landfill to sell when the plant isn't producing/operating a lot. Gypsum is sold to wallboard company, or for farming if not to wallboard spec.**

Dan Wittliff
Exhibit 2.3.1 – January 2018 Site Visit - Buck

NOTES ON DEC PLANT VISITS – Buck
JANUARY 8-10, 2018

Buck – In afternoon of January 8, 2018, received safety briefing and participated in overview discussion of issues on four ash basins (i.e., Inactive Tree-filled, Primary Pond Basin 2, Secondary Pond Basin 3, and New Primary Pond) ground water monitoring, city water supplies, NPDES permitting issues, and closure plan. Other than an Ash Stack between the New Primary Pond and the Old Primary Pond (Basin 2), there are no landfills on site.

a. Walk Down of Impoundments – Together with system owner and other DEC personnel, visited each of the impoundments at the decommissioned coal plant which is now the site of a twin-unit combined cycle plant. The air permit for the new combined cycle plant required that the company shut down Units 1 through 9. Reviewed active seeps and proposed plans to change the point of NPDES discharge compliance from the current cove to a point further north and west into the main channel of the Yadkin River.

b. Seeps – Of the almost 200 seeps for which DEC and DEP sought NPDES permits in 2014, 14 were at Buck. As a result of follow up by Duke, three more seeps were identified. Reviewed the current condition of six (verify with photos) seeps. Some of the seeps or areas of wetness could be under the influence of storm water or river level. (verify)

c. Beneficiation – DEC chose to use Buck as the site for the beneficiation project (STAR) largely because of the plant's proximity to the ash market in the IH-85 corridor. The project will use the same vendor and technology as employed at Santee Cooper. The goal is low loss on ignition (LOI, i.e., carbon) before the process and lower after the process. Some startup fuel (i.e., natural gas) is required to initiate the process and keep it going if the initial carbon content is too low. The legislative requirement to process 300,000 tons of CCR per year makes it difficult to process the required throughput and still meet the pond clean closure date in 2029. Therefore, the Company will likely request an extension of time to complete the process first or excavate and haul off site ash which can't be beneficiated by the deadline.

d. CCR on Site – The New Primary Ash Basin built in the 1980's holds 3.5 million tons of CCR.

e. NPDES – Reviewed the pond-to-pond discharge structures and efforts to lower pond levels to conduct video surveillance of the discharge pipes going to the next pond. Reviewed relocation of Secondary Pond (Basin 3). Company has sulfuric acid feed, if needed, to control pH on discharge feature. Once the NPDES permit and new outfalls are approved for the seeps and the free water, the plan is to begin dewatering the ash basins by removing the standing water. Using technology and techniques developed at Riverbend, the Company plans to move that wastewater treatment plant to Buck to treat the last of free water and any interstitial water entrained in the ash.

f. Drinking Water Issues – Because of state-mandated requirements for all of the 14 North Carolina coal-fired power plants to address potential impacts on drinking water supplies, the Company is required offer to either connect a home to an alternative public drinking water system or provide a home water treatment system (with maintenance) to each property for which even a portion of the property falls within a half mile of the compliance boundary for a CCR. The compliance boundary of a waste unit is defined as 500 feet of the toe of the dam.